DOCUMENT RESUME

ED 238 184 EA 016 283

AUTHOR Rawers, Lois J.
TITLE Precision Teaching: Advancing Student Achievement through Daily Drill and Measurement.
INSTITUTION Oregon School Study Council, Eugene.
PUB DATE May 83
NOTE 45p.
AVAILABLE FROM Publications, Oregon School Study Council, University of Oregon, 1787 Agate Street, Eugene, OR 97403 ($4.00; quantity discounts).
PUB TYPE Information Analyses (070)
JOURNAL CIT OSSC Bulletin; v26 n9 May 1983

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Academic Achievement; Charts; Demonstration Programs; Drills (Practice); Elementary Education; *Inservice Teacher Education; *Instructional Innovation; Instructional Materials; Mathematics Instruction; *Precision Teaching; *Program Implementation; Reading Instruction; Remedial Instruction; Special Education; Student Evaluation; Teacher Effectiveness; Teaching Methods
IDENTIFIERS *Great Falls Precision Teaching Project; National Diffusion Network Programs; *Oregon (Jefferson County)

ABSTRACT

After reviewing the conceptual bases and practical application of precision teaching, this analysis traces its evolution as the Sacajawea Plan, reports on its implementation in central Oregon school districts, and details the costs and procedures of adoption. Developed by Ogden Lindsley from B. F. Skinner's work in operant conditioning and extended through the Applied Behavioral Analysis methodology, the Great Falls Sacajawea Project comprises: (1) a screening procedure to identify students with basic academic skill deficiencies; (2) a means of continuously measuring student performance in basic skills necessary for learning; (3) a method for charting daily performance; (4) techniques for making decisions from charted performance; and (5) instructional support. The Great Falls Demonstration Project evaluated the effectiveness of precision teaching through a controlled study of six schools, and the project's developers concluded that the techniques produce statistically significant results inexpensively and are helpful to special and regular education students regardless of economic level. Interviews with Oregon teachers who participated in implementing precision teaching techniques in mathematics and reading instruction confirm that charting procedures were generally less rigidly followed after the initial year. Cited as factors in successful implementation are teacher dedication, administrative support, and economic conditions. Sample charts are appended. (MJL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

P. Piele

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ED238184

Precision Teaching: Advancing Student Achievement through Daily Drill and Measurement

Lois J. Rawers

EA 016 283

May 1983
Vol. 26, No. 9

OSSC BULLETIN

OSSC BULLETIN

Precision Teaching: Advancing Student Achievement through Daily Drill and Measurement

Lois J. Rawers

May 1983
Vol. 26, No. 9

ISSN 0095-6694

Individual Copy $4.00

Discount of 10% for 10 or more copies

Preface

Educational innovation is not an easy task. Many barriers lie along the way from program inception and development through implementation to firm establishment within a school or district. The National Diffusion Network (NDN) of the U.S. Department of Education serves as a source of innovative programs that have already been developed and proved effective at the development site. NDN disseminates programs in a ready-for-implementation form through training of local school personnel by original project developers.

This Bulletin describes one such NDN project, "The Precision Teaching Project: Sacajawea Plan," which was developed and validated in Great Falls, Montana. Introduction and implementation in several central Oregon school districts are traced. As the following pages show, precision teaching has earned much support among teachers and administrators for its demonstrated positive effects on student achievement.

The degree to which the project survives or is modified from the original, validated model seems related to patterns of implementation and level of continued support, most particularly moral support of teachers and economic support.

This Bulletin was written by Lois Rawers, an OSSC graduate research assistant.

Philip K. Piele
Executive Secretary

Contents

Preface iii

Introduction 1

What is Precision Teaching? 2

Origins and Underlying Principles 2
The Sacajawea Model 4

The Great Falls Demonstration Project 11

History of the Project's Development 11
Verification of the Project's Effects 12

Oregon Experience with Precision Teaching 17

Precision Teaching in Jefferson County Schools 17
Redmond School's Application of Precision Teaching in Reading 21
Bend School District's Precision Teaching Project 22

Evaluation 25

Project Dissemination, Training, and Costs 28

Conclusion 31

References 32

Interviews 33

Appendix A 35

Appendix B 36

Introduction

The "Precision Teaching Project: Sacajawea Plan" is a Developer Demonstration Project of the National Diffusion Network, U.S. Department of Education, and is based in Great Falls, Montana.

According to the brochure describing the project:

> Precision teaching is a set of measurement procedures that focuses on direct and daily measurement of academic and social behavior. When applied to academic behavior, precision teaching involves breaking the learning task into meaningful components and directly measuring the students' speed, accuracy and growth on the task. Based on this information relevant and immediate teaching decisions can be made that assure the most effective day-to-day learning environment for the individual child.

Originally designed for application in special education, implications of precision teaching for regular education soon became obvious to both developers and teachers. Consequently, they devised the project, implemented it, and have had it nationally validated for application with both regular and special education students.

Since its inception in Great Falls in 1972 and its subsequent development and validation, the project has been widely disseminated and adopted throughout the United States. In Oregon, the Precision Teaching Project has been adopted in recent years by several school districts in the central part of the state. The following chapters explore the underlying concepts of precision teaching, explain how it fits into the instructional process, detail the evolution of the Sacajawea Plan, give a history of its adoption in Oregon schools, and outline the process and costs of adoption.

What is Precision Teaching?

Origins and Underlying Principles

The principles upon which precision teaching is based can be traced to B. F. Skinner's work in operant conditioning at Harvard University during the 1940s and 1950s. Operant conditioning is the process by which the frequency of occurrence of a behavior is modified by the consequences of the behavior itself. Since Skinner's pioneering work with lower animals, many researchers have extended his principles to human behavior. In 1965 Odgen Lindsley and his students at the University of Kansas developed the concept known today as precision teaching. Their aim was to make the principles of operant conditioning relevant and useful to teachers. The Great Falls Sacajawea Project is actually an adaptation and elaboration of the work of the Lindsley group.

Researchers at the Experimental Education Unit (EEU) at the University of Washington were an additional influence on the development of the Sacajawea Project. The EEU research, also based on Skinner's principles, was concerned with developing curriculum and investigating instructional methods. Their methodology, termed Applied Behavioral Analysis, consisted of replicable instructional procedures, individual analysis, experimental control, direct measurement, and daily measurement. This is the model upon which the Sacajawea Project's verification studies were based.

The project's developers refer to precision teaching not as a teaching technique but as a "set of measurement procedures that is based

on direct and daily measurement." Through this procedure pupil progress is measured from current curriculum in use in the classroom. The teacher directly monitors performance of specific skills of concern rather than administering tests that may be only indirectly related to those skills. Measurement is dynamic (formative); individual performance data are taken daily, as opposed to static (summative) measures taken at longer intervals such as standardized tests or end-of-unit teacher-made tests. Ongoing evaluation of student performance allows the teacher to plan and evaluate individual progress, that is, to decide where to begin with a student, when to change an instructional procedure, and when to introduce a new skill.

Precision teaching procedures may be applied toward the development of a wide variety of social and academic skills, especially those that require fluent and automatic response. Skills are subdivided, or "sliced," into small component steps. A student's progress, speed, and accuracy on these steps is assessed through daily, timed drills. Data from these drills are recorded and charted each day by the students and/or teacher. Daily charting allows both student and teacher to recognize immediately when there is a learning problem or when proficiency has been achieved. Thus, the students may be involved in making decisions regarding their own learning. Precision teaching proponents point out a further benefit to students from doing their own recording and charting: children compare their performance with their own previous performance, not with that of their classmates. Thus, competition with peers is minimized.

Teachers benefit by learning about the effects and, thus, the

effectiveness of their teaching. Equipped with such knowledge they may make better informed curriculum and methods choices and adjustments and also may stay on task in terms of instructional sequencing. Continuous measurement also enables the teacher to communicate clearly and accurately to parents and administrators information about student progress and problems with a minimum of statistics and educational jargon.

The Sacajawea Model

The Sacajawea Precision Teaching Project as disseminated through the National Diffusion Network consists of the following components: (1) a screening procedure that identifies students experiencing basic academic skill deficiencies, (2) a means of continuously measuring student performance in the basic skills necessary for learning in the various curriculum areas, (3) a method for charting daily performance, (4) techniques for interpreting and making decisions from charted performance, and (5) support for instructional intervention leading to academic skill proficiency. Each component is detailed below.

Screening

Screening allows the teacher to determine (1) where a student is in terms of basic tool skills that are prerequisites for more advanced skill development and (2) how rapidly a student learns in particular curriculum areas. Specifically, screening provides diagnostic information in math, reading, and spelling. In the parlance of precision teaching, screening is a means of assessing a student's learning channels. A learning channel is the way a student receives

information, processes it, and responds. Screening provides a measure of learning channel strengths and weaknesses. For example, it would reveal whether a student's difficulty with mathematics is because of an inability to write numbers fluently or a concept that the student lacks. The student might be screened for ability to "hear-to-write" words in order to assess spelling skills, to "see-to-write" digits to assess math tool skills, or to "see-to-say" words to assess reading skills.

The project provides booklets to aid teachers in creating their own screening devices with materials directly from the school's current curriculum. One minute performance samples are then taken each day for ten days at the beginning of the school year in math, spelling, and/or reading. Thus, the teacher may gain accurate information about a new group of students in a short time to aid in individualizing grouping for instruction. Screening also identifies those students who may need special assistance or resource room placement.

According to the project's implementation handbook, screening of basic tool skills is important because "as educators we make many assumptions about pupils' skill development. For example, we assume that a particular student knows a skill supposedly taught in a previous grade. We have found in far too many cases that the skills were taught, but due to lack of practice or a failure to insist on high frequency performance, the skill was not learned or retained."

Continuous Measurement of Performance

After initial screening the teacher further assesses performance to determine where to begin instruction. This process, called probing, narrows down from a broad problem area, such as mathematics, to a more

specific problem, such as regrouping. Probing reveals, or pinpoints, precisely delimited targets for instruction, practice, and daily monitoring.

Students practice daily those skills that have been pinpointed through probe worksheets. Their progress is monitored through a daily series of one-minute timings of performance on individual rate-sheets specially designed to measure proficiency in the targeted skill. Proficiency is defined as "a performance level believed to be necessary in order to assure generalization and maintenance of behavior." Precision teachers call an individual student's proficiency level his or her "aim." The implementation handbook provides suggested standards for pinpointed skills in reading, handwriting, spelling, and mathematics. These are given in terms of correct responses per minute with no incorrect responses. For example, a second grader's proficiency aim might be to see-to-say 200 words per minute. In mathematics, an individual aim might be to see-to-write answers to 70 addition facts per minute. A spelling aim could be to hear-to-write 15 dictated words per minute. A student working toward accuracy of cursive letter formation might aim to write cursive letters correctly at the rate of 75 per minute.

Timings are administered at a regular time each school day by means of a stopwatch, timer, or taped music with beeps at one-minute intervals. The latter device frees the teacher to move about the room, examine charts, and confer with individual students. Students practicing written skills mark answers with water soluble pens on

acetate sheets overlaying the rate sheet, thus reducing paper usage. After checking their own responses against answer keys and recording the number of correct and incorrect responses, students simply clean the acetate with a damp sponge and proceed with another timing on the same rate sheet. Students measuring performance in see-to-say skills may work in pairs with one student responding and the other timing, recording the number of correct responses, and charting. Project developers advise teachers to allow about 15 minutes for a precision teaching timing and charting session once students have learned the procedure.

Charting

Data on frequency of correct responses collected daily are most easily interpreted when presented on charts that make clear the rate at which a child is learning. The Sacajawea Project employs "6-cycle" and "3-cycle" standard behavior charts (see Appendixes A and B) that display performance in terms of proportional growth so that the relative rate of learning is presented rather than the absolute amount of learning. For example, the rate of change in increasing a reading rate of 5 words per minute to 10 words per minute within a week results in the same "learning line" slope on the chart as an increase from 50 to 100 words per minute within the same number of days. Thus, a student can view and compare her proportional rate of growth with her own previous rate rather than with the absolute growth of classmates. In addition, the standard behavior chart can be used to record behaviors that occur as often as 1,000 times per minute to as seldom as once per day. One 8 1/2 by 11 inch chart can be used to display data for up to twenty weeks of

performance measurement.

Project developers are aware that many teachers suffer initial aversion to the standard behavior charts, but explain that children are not as prone to "chart-shock" as are adults. Both implementation and training manuals include step-by-step guidelines and helpful hints for developing charting skills for both teachers and students. They advise a gradual incorporation of actual charting into the precision teaching process and suggest having older children assist primary pupils in charting.

Accurate and continuous charting reveals to teacher and student learning patterns or trends that can provide a basis for decision-making.

Decision-making

Charted performance data are used to determine when to advance a student to new instructional objectives, or pinpoints, and when to arrange instructional alternatives. Project developers strongly advise including the student in this decision-making process. They suggest, "When problems come up, ask the student what he thinks is the problem, how you can help, and what are some alternatives. Show concern and offer assistance. The student needs to know that his learning is important...to you and to him."

Precision teachers are encouraged to require a student to meet his or her aim for two or three consecutive days before moving along to a succeeding sequential skill. If the student is still learning, in other words, if the "learning line" on his chart has not leveled off, he should be allowed to continue to grow before changing to a more

difficult skill.

Learning lines will reveal to both teacher and student whether the skill being practiced is too hard or too easy or if the student is not learning fast enough. Thus, a change may be indicated, such as a move to a prerequisite skill in the sequence, "slicing" the skill into finer components, attacking a more difficult skill, or setting a higher aim. The teacher may note the need for more practice or a different approach to practice, or the teacher may decide to alter motivational strategies with the particular student.

Instructional Support

The instructional intervention component of the project has two main purposes. The first is to develop proficiency in skills prerequisite for a student's grade placement, that is, to provide remediation. The second is to provide instruction in tasks appropriate to the student's grade level. Both of these instructional purposes are supported by curriculum materials available through the project or developed by teachers in the implementing school. As a part of the Sacajawea Project training program, teachers learn standardized methods for adapting their own school's existing curriculum to a rate sheet format. A Precision Teaching Materials Bank is also available through the project. It consists of approximately 10,000 teacher-made individual practice sheets that are sequentially arranged and coded by curriculum area.

In addition to the major components of the project detailed above, much emphasis is placed upon management of precision teaching. No one management strategy is advocated, but numerous helpful hints are

suggested to ensure teacher sanity and increase the likelihood of the program's survival. Teachers are encouraged to establish an organized, daily routine and to assign as many tasks to students as possible. These range from passing out precision teaching materials to timing each other in pairs to charting their own daily data and participating in decision-making.

The Great Falls Demonstration Project

History of the Project's Development

Ray Beck, school psychologist, originated the Sacajawea precision teaching model in 1972. He continues as its director today. The project, which he describes as "still alive and healthy after ten years," has been applied and adopted in school districts in forty-four states, as well as in England. These adoption districts range from large city districts, such as Denver Schools, to a one-room school district in North Dakota.

Prior to conception of the Sacajawea Plan, Great Falls special education teachers and psychologists had experienced success in controlling the acting-out behaviors of emotionally disturbed children through applied behavioral analysis. They were convinced that a similar approach could be used to improve the academic performance of these children. Their search for a program already proved in a controlled, research setting led them to the Experimental Education Unit (EEU) at the University of Washington and the Spokane, Seattle, Tacoma (SST) Project where precision teaching methods emanating from EEU research were being applied.

A Title III ESEA grant provided Beck and his colleagues with three years and nearly $240,000 to develop and implement a model for delivery of services to children with learning deficiencies in kindergarten through third grade. This funding allowed for training of staff, visitations to Washington research and application sites, and further inservice training of staff throughout the first year.

Verification of the Project's Effects

Six elementary schools volunteered to participate in the implementation and evaluation of precision teaching methods. These six formed three pairs of schools with the members of each pair similar in terms of students' family income, class size, pupil-teacher ratio, cost per pupil, and amount and type of special services offered. One school of each pair was randomly assigned to the control group, while the other was part of the experimental group. Students in all six schools were prescreened through the screening procedures detailed in the previous chapter. This process identified those children who lacking basic tool skills in reading, spelling, and math, the lack of which would hinder them from growing with their peers.

Approximately 100 students in the experimental schools were thus identified and targeted for remediation treatment through precision teaching applied in both their regular classroom and the resource room.

Postscreening at the end of that first year of those children who had earlier been identified as lacking basic tool skills in both the experimental schools and the control schools revealed that fourteen of the nineteen experimental groups were significantly superior to their comparison control groups on the posttest. One experimental group had caught up to its previously superior control comparison, while three comparisons showed no difference between control and experimental groups. In only one pair had the control group gained significantly on the experimental group.

A 1976 report to the Office of Education summarized these results:

1. Experimental group became superior to or caught and/or passed control group	15	(79%)
2. No difference between experimental and control	3	(16%)
3. Control group superior to experimental group	1	(5%)

In addition to these results being statistically significant, the project's developers claim that precision teaching techniques also produce educationally important results. They support this claim in several ways. First, in the twelve comparisons exhibiting no significant difference on the prescreening but showing a significant difference in favor of the experimental group on the postscreening, the magnitude of that increase was large (greater than one-third standard deviation of all students in both groups). Also of educational importance are the results showing precision teaching techniques to be more effective in first grade than in second and third grades. Further, this technique appears to be equally helpful to students regardless of their economic levels; results do not show it favoring the classrooms with more students from low income families.

One more claim of educational significance concerns the project's implementation. The developers explain that it does not require any special curriculum or apparatus. Once teachers are trained in the techniques, continued implementation of precision teaching is remarkably inexpensive.

Due to the "mainstreaming" nature of the precision teaching methods, classroom teachers were soon applying the techniques with regular education students. This was true in both Great Falls elementary schools and in other districts to which the project had been

disseminated. Aided by further funding through Title IV-C ESEA and the National Diffusion Network, project developers extended their model and verified precision teaching as an effective technique for improving basic skills of regular education students. This verification was reported to the Office of Education Joint Dissemination Review Panel (JDRP) in 1979.

This project was named the Sacajawea Plan II after Sacajawea Elementary, the experimental unit in this second verification study. Sacajawea closely mirrored the control unit, Chief Joseph Elementary, with respect to average academic achievement of students before intervention, demographics, and socioeconomic backgrounds of students. Since Great Falls students do not take standardized achievement tests before fourth grade, fourth-grade achievement test performance at the control school was compared with that of the experimental school. This comparison is shown in table 1 from the 1979 JDRP report.

Table 1

Comparison of Percentile Performance of Experimental and Control Fourth Grade Pupils Before and After Intervention

School Performance	Percentile Performance Reading	Percentile Performance Mathematics
Before Treatment 1975-76		
Experimental-Sacajawea	77	40
Control-Chief Joseph	82	46
	-5	-6
After Treatment 1976-77		
Experimental-Sacajawea	95	86
Control-Chief Joseph	71	54
	+24	+32

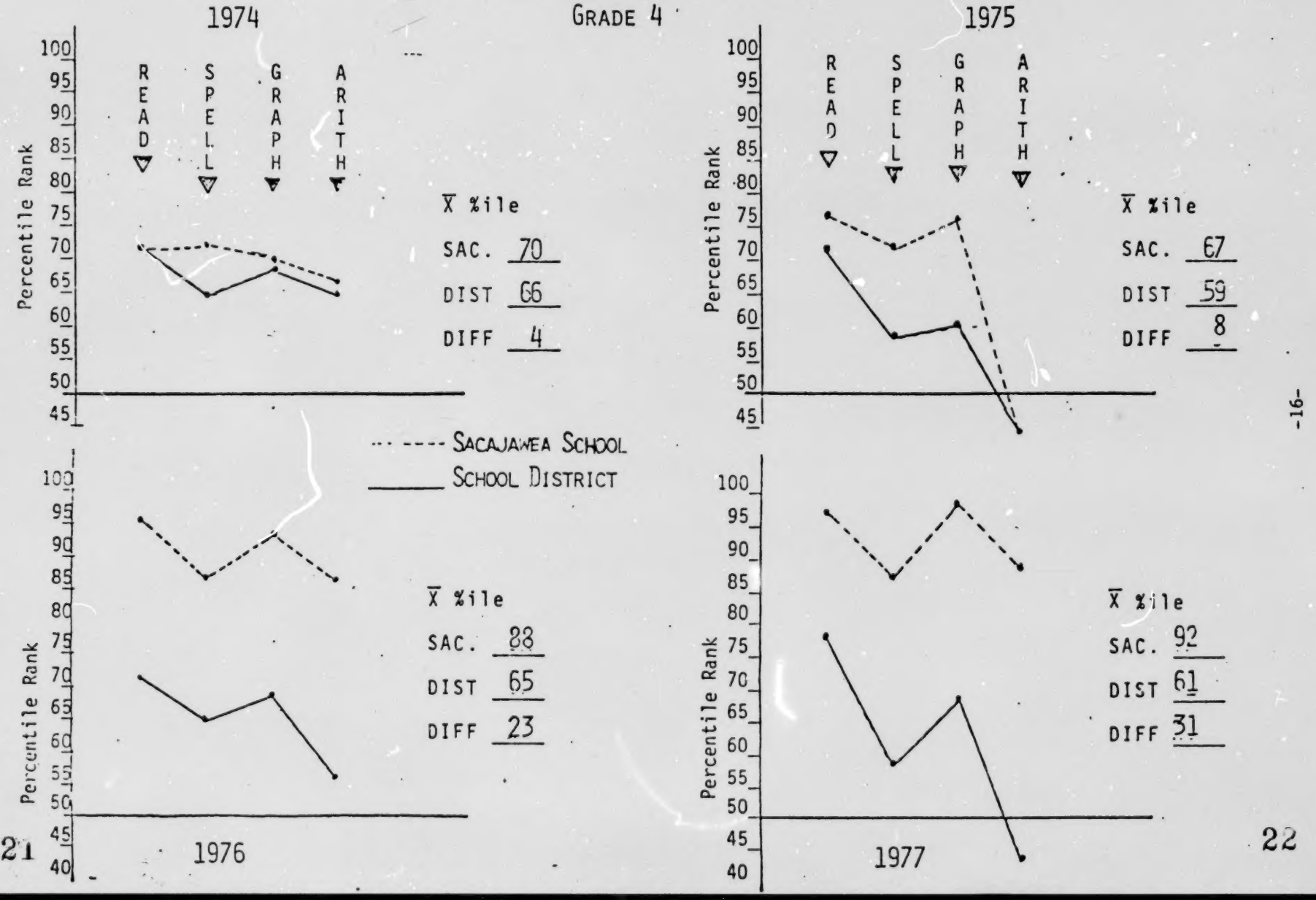
A further comparison was made of Sacajawea fourth-grade students' performance with districtwide fourth-grade performance on the Iowa Tests of Basic Skills. The accompanying graphs from the same 1979 report demonstrate this comparison for the years 1974 (before intervention), 1975 (after one year of precision teaching was started at Sacajawea), 1976 (after two years of treatment), and 1977 (after three years of treatment). The report explains, "To strengthen the observations, Sacajawea students' scores were not extracted from the District performance scores."

Based upon these comparisons between treatment and control schools, the project's developers concluded that precision teaching procedures "lend to the overall mainstreaming effort by providing educators with a tool that is applicable to both the special as well as the regular class teacher."

IOWA TEST OF BASIC SKILLS (1974-1977)

SACAJAWEA COMPARED TO DISTRICT

GRADE 4



Oregon Experience with Precision Teaching

Precision Teaching in Jefferson County Schools

John Cunnion, a certified Precision Teaching Project trainer, was instrumental in bringing the program to central Oregon districts. Cunnion, then school psychologist with Jefferson County ESD, arranged three-day training sessions in August 1979 for Warm Springs and Culver teachers and in August 1980 for Madras and Metolius Elementary School teachers and principals. Great Falls consultants traveled to the districts for these sessions and returned twice for followup sessions during the first year of each adoption. Training was funded by Title IV-C grants and district matching funds.

According to Tony Miller, principal of Madras Elementary School, prior to the adoption of precision teaching students' reading achievement scores had been on the rise, and district administrators were anxious to find a means of similarly improving mathematics achievement. Precision teaching seemed a promising candidate to help meet this need, as well as provide a better means by which teachers could make specific curriculum decisions and keep track of individual student progress. An additional "spin-off" benefit that Miller has seen realized through the project has been more inter- and intragrade level communication among teachers than existed previously. This communication revolves around student and teacher progress with the project.

Precision teaching procedures were implemented in mathematics by those teachers who received training. Pre- and posttest data gathered

from California Achievement Tests and assembled by Cunnion from 1980-81 administrations of the tests at Metolius and Madras Elementary Schools revealed that students made more than a month's academic growth in mathematics for each month in the program during its first year of implementation. He concluded that "Precision Teaching is an effective classroom tool....Considering that the teachers were learning Precision Teaching procedures during most of the year, we might expect to see more gain in subsequent years if implementation is encouraged and supported in the district."

Although not all Madras Elementary teachers who were originally trained continue to employ all precision teaching procedures as rigorously as during that first year of implementation, most continue to use precision teaching materials in daily practice and timing sessions. Many do not have students do the charting as extensively as they did initially.

Aloha Kendall, Madras Elementary fourth-grade teacher, devoutly adheres to precision teaching procedures and employs them in many curricular areas besides mathematics. For example, in social studies she might ask students to name all the facts they can recall about early Oregon explorers in one minute. In mathematics Kendall coordinates precision teaching drills with the basal textbook sequence and uses it to measure progress toward mastery of basic addition, subtraction, multiplication, and division facts, column addition, regrouping, and story problems.

A fifteen-minute timing session in her classroom finds some students completing written rate sheets while others are timing one

another on oral drills. Each day students complete four one-minute timings of their performance on whatever skill they are aiming to master. They record their best score for the day on standard behavior charts. Kendall "looks over their shoulders" each day and collects their folders once a week for a closer examination. She claims, "Charting is hard. I have to explain it at least three times at the start of the year, but then, I also have to explain long division many times." She feels the advantage of charting is that "kids get to analyze and be in charge of their own learning. They know when it's time for a phase change instead of waiting for a teacher to tell them." She sees her job as teaching children how to learn.

Suzanne Brown, principal and resource room teacher at Metolius Elementary, south of Madras, explains that all teachers in the building participated in the 1980 precision teaching training and implemented all aspects of the project into the mathematics curriculum that first school year. Last year they continued using the procedures with some modifications, especially in frequency and mode of charting. This school year continuation of precision teaching was optional. All chose to continue, although many have adapted simplified charts or have eliminated the charting component altogether. Teachers remain enthusiastic, however, about precision teaching materials, timing sessions, and the enhanced drills on basic facts.

Brown also emphasizes the improved mathematics achievement test scores that resulted and have continued since the first year of project implementation in the school. She adds, "As a further gauge, I now see far fewer upper grade students coming to the Educational Resource Center

for basic math drill."

Other modifications made by Metolius teachers include doing all timings orally in first and second grades with the assistance of an aide and parent volunteer, and reduction of written timings to twice a week and closely supervised by a parent volunteer in third grade. In fourth, fifth, and sixth grades, taped music with beeps serves as the timing device. Students who have met their aim on a pinpointed skill for two days in a row at their seats move to a table at the rear of the room to be timed a third time on the rate sheet. Here, they must prove their performance under the watchful eye of the teacher.

Barbara Hutchins, fourth- and fifth-grade teacher who has developed her own record sheets, is positive about precision teaching but is "glad we are free to modify it." She uses it as a tool supplementing the regular mathematics curriculum. For example, when she recently realized some students were experiencing problems in long division due to faulty subtraction skills, she immediately inserted precision teaching subtraction practice into their daily routine.

Nels Thompson, principal at Culver Elementary, sees precision teaching as a viable approach to increasing retention of basic mathematic facts, enabling "children to hold them in their conscious memories." He also likes the structured approach it provides for students and teachers. Elementary teachers at Culver continue to employ precision teaching techniques in this, the fourth year of implementation, but they also have eliminated or minimized daily performance charting.

Redmond School's Application of Precision Teaching in Reading

Della Brandt, principal of Edwin Brown Primary School in Redmond, has been project leader since the Precision Teaching Project was implemented nearly three years ago. Great Falls trainers traveled to Redmond in August 1980 to conduct a three-day training session, and teachers began using the procedures that fall. Unlike the Jefferson County adoptions in mathematics, Edwin Brown teachers incorporated precision teaching techniques into the reading program. During that first year teachers constructed their own materials bank of rate sheets using selections from the reading series. Thus, their precision teaching materials serve to reinforce and measure growth in the regular reading curriculum. Brandt recalls that developing materials at the same time as implementing the program was a challenging task.

Brandt explains that teachers have seen reading skills and reading achievement scores improve over the past three years. She cautions, though, that several aspects of reading instruction were changed at about the same time that the Precision Teaching Project was introduced. These changes included adoption of a new basal reading series, increased emphasis upon comprehension in reading, and teacher skills improvements. Thus, it is difficult for her to credit the improvement to any one of these changes.

She does feel that the repetitive practice and timings, which play an integral part in precision teaching, have an impact upon instant word recognition and, therefore, reading fluency. She explains, "Repetition helps children feel what it is like to read smoothly. If they never know what it feels like, it will be hard for them to imitate." Further,

she claims, fluency cannot help but contribute to comprehension. If a child reads fluently without struggling over words, she can more easily grasp the meaning of what she reads.

In contrast to precision teaching in mathematics, its application in reading requires performance timings of students individually. This means teachers who time each student daily require more assistance. Fiscal restraints have led to staff cutbacks and partial curtailment of precision teaching at Edwin Brown, which houses grades one through three. The project continues in the third grade, where students can time one another, and first grade, where parent volunteers, cadet teachers, and principal move from class to class aiding teachers during precision teaching sessions.

Arline James, a third-grade teacher at Edwin Brown who taught first grade until this year, confirms Brandt's claim that precision teaching practice gives children a sense of what is fast, fluent reading. James, who utilizes the individual 6-cycle behavior charts, is convinced of the worth of this approach with beginning learners. She states, "If I had my druthers, despite the teacher time and organization required to fully implement precision teaching, I still feel any child would benefit from exposure to this type of program sometime during the first three years of school, although perhaps not every year. I wouldn't teach first grade again without it."

Bend School District's Precision Teaching Project

Pat Kern, mathematics and science curriculum coordinator for Bend School District, explains that precision teaching was introduced in the district in 1981 as part of a multifacetted drive toward mastery

learning and accountability in mathematics instruction. Informal screening of high school students had revealed that far too many students were limited by inadequate facility with basic mathematics skills. A $5,000 grant from the Oregon Department of Education made possible a three-day training session in Bend with Great Falls consultants during August 1981. Twenty-seven of the eighty elementary teachers who volunteered for the training were selected to participate.

Initially teachers had feared that the pressure of timed drills would have a deleterious effect upon students. Kern reports, though, that those twenty-seven teachers who implemented precision teaching measurement found their students experiencing success in learning without tears. They also found that students progressed through the regular mathematics curriculum much faster than their students had done prior to introduction of the project. Kern feels that precision teaching benefits students by providing a vehicle by which teachers can immediately recognize when learning has ceased and instructional adjustments must be made. Above all, Kern believes it demonstrates that "students can memorize and retain basic facts."

Jan Gray, teacher at Bend's Juniper Elementary School, confirms this. Last year, through precision teaching, she saw her students master their basic first-grade math facts, many by midyear, and continue with second-grade materials before the end of first grade. In addition, this past fall when she continued as the group's teacher in their second year of school, she realized her students sustained more of their proficiency with basic facts than had previous groups she had accompanied from first to second grade. Due to funding reduction after

that first pilot year of precision teaching in the district, materials were not as readily available so Gray did not continue the procedures this fall. By midyear, though, when she realized her students were not mastering second-grade mathematics as readily as they had their first-grade skills, she resumed the daily drills and timings. Within one week she felt that her students were back "on track."

Gray believes that the keys to precision teaching's success with students are the daily drills and the immediate reward of seeing progress. She taught her first graders to chart with her at the very beginning of last year, but felt they had difficulty interpreting the charts without her help. If starting over again, she would continue to have them chart but would introduce a simpler form at a more gradual rate.

Peggy Griffiths, fifth-grade teacher at Buckingham Elementary in Bend, uses precision teaching procedures with her math group of underachievers. Her students chart their performance daily on 3-cycle behavior charts. She examines each student's chart every day and makes decisions regarding necessary changes in their individual aims. In addition, she confers with five students each day, making sure they are checking and charting accurately.

She feels that this group of students would not have achieved the level of basic mathematics facts mastery she observes now without the help of precision teaching. She explains, "When they reach an aim they know they have succeeded. It works as a real pat on the back for underachievers."

Evaluation

Keith Johnson, curriculum coordinator for Jefferson County School District 509J, sums up his feelings about precision teaching by saying:

> Precision teaching, while requiring a high level of interest and dedication on the part of the teacher, takes the drudgery out of drill and is highly motivating for kids. It produces measurable effects in basic skills achievement. It is good and it works, but it's not a panacea.

Observations and interviews with precision teachers confirm Johnson's point that teacher enthusiasm and dedication are crucial to the success of the project. As Jan Gray of Juniper Elementary, Bend, puts it, "Dedication and attitude of teachers are so important because the amount to be learned and the volume of materials to become familiar with are overwhelming that first year."

John Cunnion, who was instrumental in precision teaching's implementation in central Oregon, points to administrative support as the key factor in a successful project implementation. He explains, "When the building administrator is trained and involved in the precision teaching project, he or she can understand and discuss problems with teachers and ensure a higher degree of implementation."

The continued assistance of knowledgeable project advocates to aid and encourage teachers in their efforts seems vital to faithful implementation of the precision teaching model. The followup sessions by Great Falls consultants during a project's first year help serve this purpose. Pat Kern of Bend School District remembers that those visits by consultants to all precision teachers' classrooms worked like "a shot in the arm." Without reinforcement of strategies, help in solving

routine problems, and encouragement early in the implementation, teachers tend to become discouraged with the project.

What about long-run survival of the model? Components of precision teaching, particularly practice sheets and timed drills, remain in use beyond the initial year of implementation. Charting and chart-based decisions, if continued at all, generally survive in simpler, modified form, especially in regular classrooms. Teachers judge that students continue to benefit from use of precision teaching materials even without rigid adherence to all procedures. The original Great Falls model, though, was designed to comprise a set of daily measurement procedures that would yield information upon which "relevant and immediate teaching decisions can be made that assure the most effective day-to-day learning environment for the individual child." It was this model, employing not only practice and drill but also daily charting and chart-based decisions, that was originally verified as producing statistically and educationally significant improvements in academic skills.

According to Ogden Lindsley, professor at University of Kansas and the "father" of precision teaching, "Drill sheets will help teachers remediate children, but charting could maximize learning. It's so powerful a tool." He contends that educators are content to bring students up to grade level and stop, whereas, if they stayed on course with precision teaching, students would go far beyond grade level in fluency. He adds, "The only way to get this done would be to reward teachers and children for gains in student learning."

Economic limitations have an impact upon continuation of precision

teaching procedures especially in the reading curriculum. Daily measurement in this curricular area requires separate timing sessions with individual students as contrasted with whole-group timings in other areas. Funding cutbacks that eliminate teacher aides from a school staff severely curtail the teacher's ability to measure each student's performance daily. The Redmond experience underscores this problem of project continuation.

Precision teaching implementations in Oregon seem to follow a common pattern beginning with training of teachers in procedures just before school begins in the fall. Throughout the ensuing school year teachers initiate the program with students, as well as develop many of their own rate sheets from curricular materials used in the district. In addition, they work toward proficiency with precision teaching techniques. It is no wonder that teacher dedication is so important a prerequisite for this overwhelming task. In succeeding years of the implementation, use of precision teaching materials and timings are continued while daily data-taking tends to be modified or eliminated. Moreover, students who make gains in basic skills through precision teaching procedures one year may not be in a precision teacher's classroom the next year. Awareness and study of this pattern may allow future implementers to make adjustments in order to provide a greater opportunity for its successful and faithful implementation over the long run.

Project Dissemination, Training, and Costs

The Precision Teaching Project is a part of the National Diffusion Network (NDN). The NDN is a system whose purpose is to assist school improvement efforts by disseminating information and technical assistance to local school districts. The NDN approach employs innovations that have been developed by school-based educators and that have been proved effective. This effectiveness, or validation, is determined by the Joint Dissemination Review Panel of the U.S. Department of Education. The NDN works through the interaction of two types of agents: developer/demonstrators and state facilitators. The Great Falls Precision Teaching Project is a developer/demonstrator model that has been approved and funded for dissemination through the NDN. The Oregon Facilitator Project (OFP) is funded by the NDN to help Oregon schools discover how NDN projects can be utilized to improve local programs. Thus, the state facilitator provides a link between the project developer and the local school district. In Oregon, the OFP can help local districts assess needs, identify appropriate Developer/Demonstrator models to suit a district's needs, develop program proposals, and arrange funding.

As a developer/demonstration project, the Precision Teaching Project provides both onsite training in Great Falls and offsite training in adopting school districts. The initial three-day training may be held either on- or offsite. It consists of lecture, demonstration, observation, and practicum exercises in precision teaching techniques. At the completion of this initial training

sequence, each trainee has access to the Precision Teaching Materials Bank of approximately 10,000 practice sheets via a materials directory listing these sheets. Training units of up to twenty educators consist of regular and special education teachers, support personnel, and building or program administrators. The unit may be composed of representatives from one or more schools with at least two members for any one school. A district administrator must be a member of the training unit.

Followup consultation and training offsite in the adopting district generally occur six to twelve weeks after the initial three-day training. This followup involves a certified precision teaching trainer presenting a review for trainees and awareness sessions for new or interested staff members who were not members of the original training unit. It also involves classroom observation and individual consultations between trainer and precision teaching trainees. Costs for training, followup, and materials are usually the responsibility of the adopting district. Materials for implementation currently run approximately $1.75 per pupil; training costs about $10.00 per trainee plus travel and per diem expenses. Either trainers travel to the adopting district or trainees travel to Great Falls.

Schools interested in becoming acquainted with the project or contemplating introducing it within their districts may arrange brief awareness workshops giving a general overview of the project's goals, objectives, and activities. Information regarding awareness and training may be obtained from: Dr. Richard Pedee, Oregon Facilitator Project, Multnomah County ESD, 220 SE 102nd, Portland, Oregon 97216, or

Dr. Ray Beck, Precision Teaching Project, 3300 Third Street NE, Great Falls, Montana 59404.

Conclusion

Precision teaching as a technique for directly and continuously monitoring student performance in the regular curriculum works to improve learning. The Great Falls verification of the Sacajawea Plan has shown this. It is particularly effective for those skills in which rapid and fluent response is required.

Oregon implementations have initially followed the model and applied all its components faithfully. Subsequent to introduction of precision teaching, most Oregon precision teachers have continued use of project materials with their students, but many have modified or eliminated daily data-taking procedures. They judge that student learning continues to improve due to the practice and timed drill components alone. The fact remains, though, that verification of the model's effectiveness was based upon application of all its integral components.

Continued encouragement of teachers and assistance by a project advocate seem crucial to continued success of the project. Economic factors have also played a part in the project's continuation.

References

Beck, Ray. "Report for the Office of Education Dessemination Review Panel." Great Falls, Montana: Precision Teaching Project, 1976.

Beck, Ray. "Report for the Office of Education Joint Dissemination Review Panel." Great Falls, Montana: Precision Teaching Project, 1979.

Blackburn, Katia. "Precision Teaching Pits Students against Themselves," Bend Bulletin.

Cunnion, John. "Precision Teaching Program Evaluation, 1980-1981." Jefferson County ESD Report, 1982.

"A Great Idea from Great Falls, Montana," descriptive brochure, Great Falls, Montana: Precision Teaching Project, undated.

Haring, Norris G., Thomas C. Lovitt, Marie D. Eaton, and Cheryl L. Hansen. The Fourth R: Research in the Classroom. Columbus, Ohio: Charles E. Merrill, 1978.

Lovitt, Thomas C., In Spite of My Resistance...I've Learned from Children. Columbus, Ohio: Charles E. Merrill, 1977.

Miles, Deborah Joan, "The Effect of Advocacy on the Implementation of Diffusion Network Programs in Seventy-four School Districts." Doctoral dissertation, Boston College, 1981.

"Precision Teaching Project: A Program Description," pamphlet. Great Falls, Montana: Precision Teaching Project, undated.

Precision Teaching Project Implementation Manual. Great Falls, Montana: The Precision Teaching Project, undated.

Precision Teaching Project Training Manual. Great Falls, Montana: The Precision Teaching Project, 1980.

Interviews

Marlene Alley, fifth-grade teacher, Culver Elementary School, Culver, Oregon. Interview January 27, 1983.

Ray Beck, director, Precision Teaching Project, Great Falls Public Schools, 3300 3rd Street North East, Great Falls, Montana. Telephone interviews March 7 and April 18, 1983.

Della Brandt, principal, Edwin Brown Primary School, Redmond, Oregon. Interview January 28, 1983.

Sue Brown, principal, Metolius Elementary School, Metolius, Oregon. Interview January 27, 1983.

John Cunnion, former school psychologist, Jefferson County ESD, Madras, Oregon. Interview January 28, 1983.

Jan Gray, second-grade teacher, Juniper Elementary School, Bend, Oregon, Telephone interview April 19, 1983.

Peggy Griffiths, third-grade teacher, Buckingham Elementary School, Bend, Oregon. Telephone interview April 19, 1983.

Carolyn Herringshaw, third-grade teacher, Metolius Elementary School, Metolius, Oregon. Interview January 27, 1983.

Barbara Hutchins, fourth- and fifth-grade teacher, Metolius Elementary School, Metolius, Oregon. Interview January 27, 1983.

Arline James, third-grade teacher, Edwin Brown Primary School, Redmond, Oregon. Interview January 28, 1983.

Keith Johnson, curriculum coordinator, Jefferson County School District 509J, Madras, Oregon. Telephone interview January 20, 1983.

Aloha Kendall, fourth-grade teacher, Madras Elementary School, Madras, Oregon. Interview Janaury 27, 1983.

Pat Kern, math and science curriculum coordinator, Bend School District, Bend, Oregon. Interview January 27, 1983.

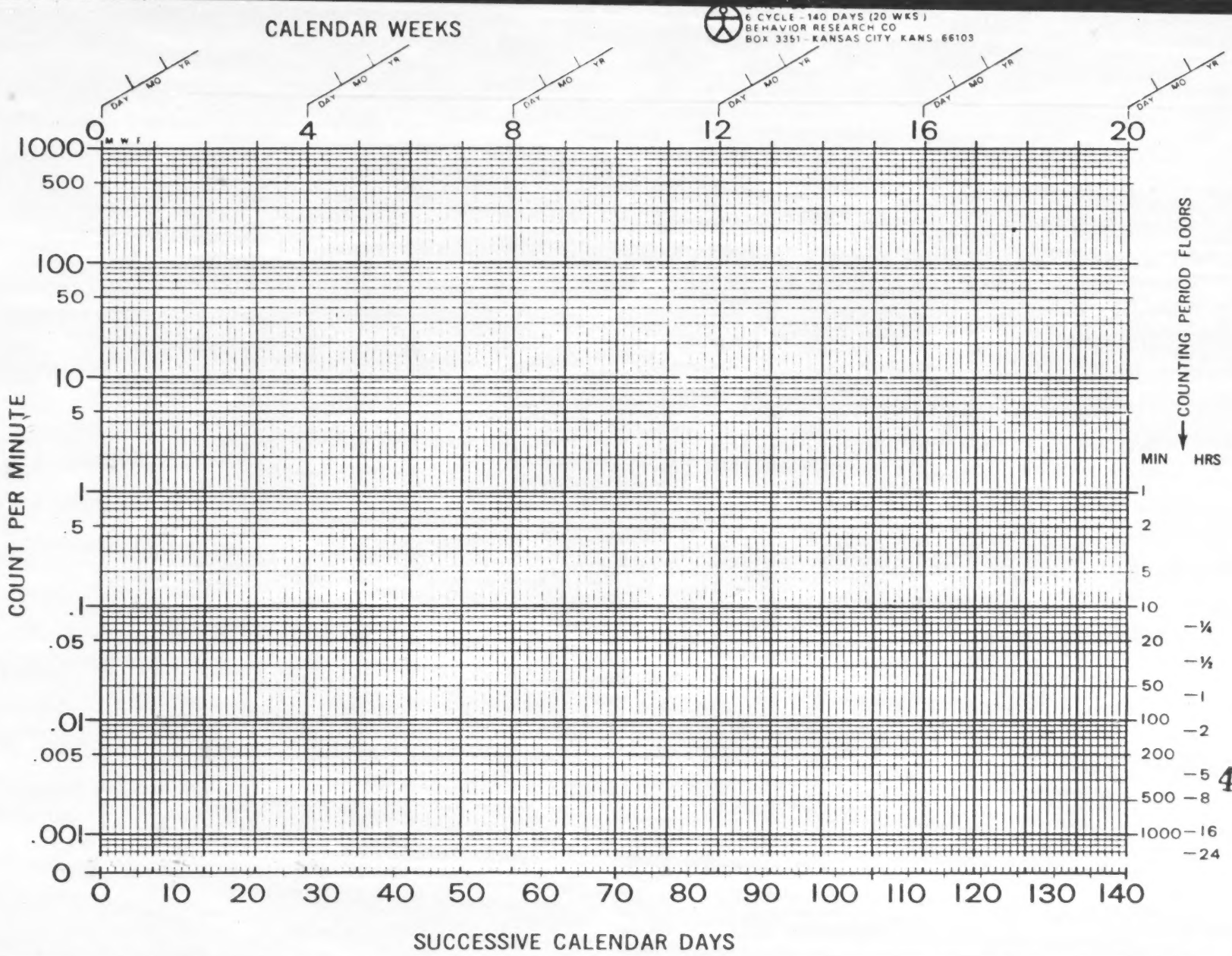
Ogden Lindsley, professor, University of Kansas, Lawrence, Kansas. Telephone interviews March 31 and April 19, 1983.

Tony Miller, principal, Madras Elementary School, Madras, Oregon. Interview Janaury 27, 1983.

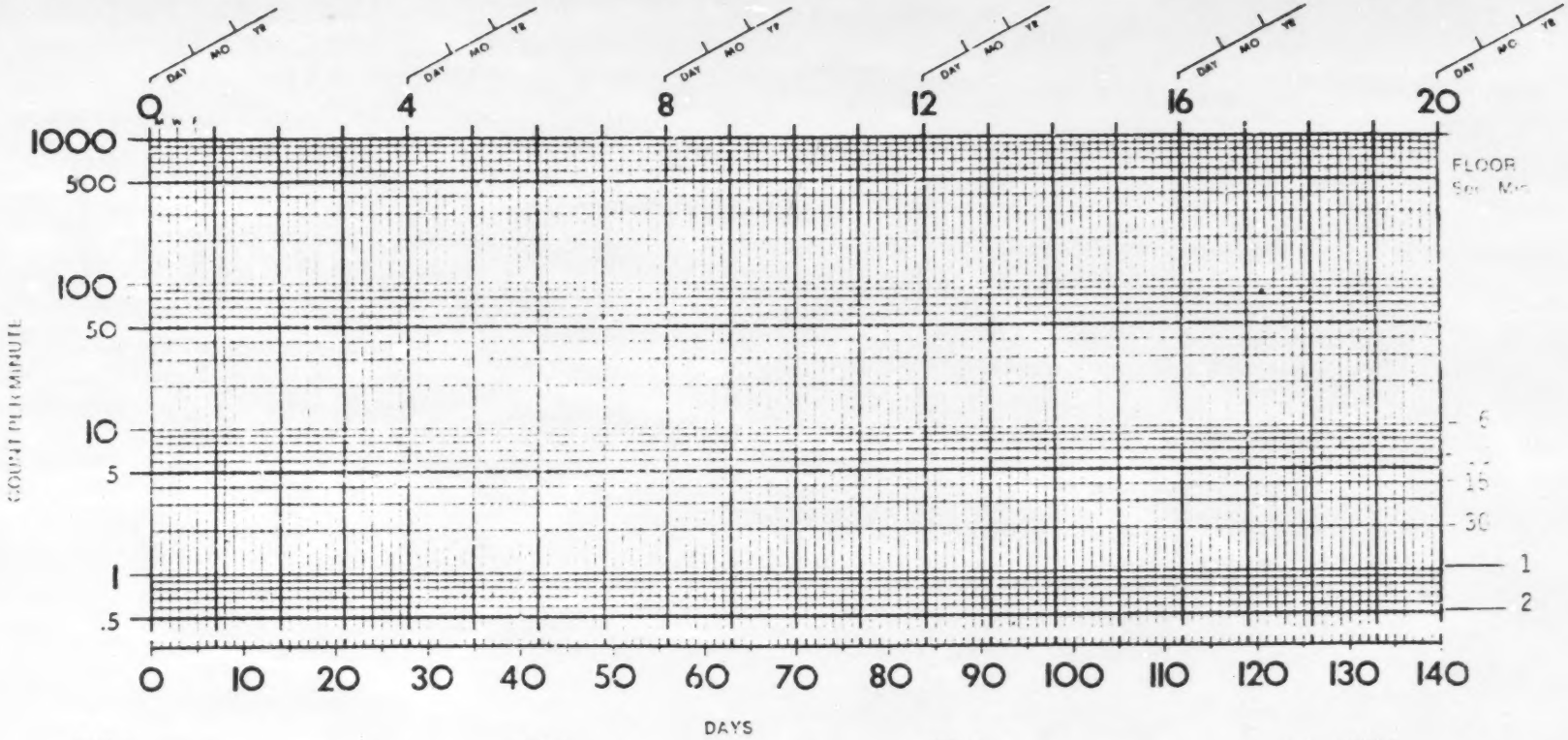
Dick Pedee, Oregon Facilitator Project, National Diffusion Network, 220 SE 102nd, Portland, Oregon. Telephone interview January 10, 1983.

Loretta Quant, sixth-grade teacher, Metolius Elementary School, Metolius, Oregon. Interview Janaury 27, 1983.

Nels Thompson, principal, Culver Schools, Culver, Oregon. Interview Janaury 27, 1983.


6 CYCLE - 140 DAYS (20 WKS)
BEHAVIOR RESEARCH CO
BOX 3351 - KANSAS CITY, KANS. 66103
CALENDAR WEEKS
DAY MO YR
0 4 8 12 16 20
M W F
1000
500
100
50
10
5
1
.5
.1
.05
.01
.005
.001
0
COUNT PER MINUTE
COUNTING PERIOD FLOORS
MIN HRS
1
2
5
10
20 —¼
50 —½
100 —1
200 —2
500 —5 —8
1000 —16 —24
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140
SUCCESSIVE CALENDAR DAYS
SUPERVISOR
ADVISER
MANAGER
BEHAVER
AGE
LABEL
COUNTED
DEPOSITOR
AGENCY
TIMER
COUNTER
CHARTER

Appendix B



Date	M	T	W	Th	F	Date	M	T	W	Th	F	Date	M	T	W	Th	F	Date	M	T	W	Th	F
		WK 1						WK 2						WK 3						WK 4			
		WK 5						WK 6						WK 7						WK 8			
		WK 9						WK 10						WK 11						WK 12			
		WK 13						WK 14						WK 15						WK 16			
		WK 17						WK 18						WK 19						WK 20			

SCHOOL MANAGER BEHAVER AGE GRADE PINPOINT

OSSC
oregon school study council
124 college of education, university of oregon
eugene, oregon 97403

Non-Profit
Organization
U.S. Postage
PAID
Permit No. 63
Eugene, Oregon